

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

In the Matter of	)	
	)	
Review of Part 87 of the Commission's Rules	)	
Concerning the Aviation Radio Service	)	
	)	WT Docket 01-289
	)	
To: The Commission	)	

**COMMENTS OF ROCKWELL COLLINS, INC.**

Rockwell Collins, Inc. ("Rockwell Collins") pursuant to Section 1.415 of the Federal Communications Commission's ("Commission's" or "FCC's") rules, hereby files electronic comments in the above referenced proceeding,<sup>1</sup> which seeks to consolidate, revise, and streamline the Part 87 rules governing the Aviation Radio Service.

**INTRODUCTION**

Rockwell Collins is a major manufacturer and integrator of avionics and Global Positioning System (GPS) equipment and systems for civilian and military markets. Rockwell Collins is a global company that manufactures a complete line of civilian and military aeronautical radio communications, navigation, and surveillance equipment, including Instrument Landing System (ILS) receivers, L-Band Distance Measuring Equipment (DME), Traffic Alert and Collision Avoidance units, Air Traffic Control Radar Transponders, L-Band aeronautical mobile satellite communications equipment, C-Band Radio Altimeters, Microwave Landing System (MLS) receivers and weather radars.

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<sup>1</sup> See In the Matter of Part 87 of the Commission's Rules Concerning the Aviation Radio Service, WT Docket No. 01-289, Notice of Proposed Rulemaking, 66 Fed. Reg. 64785 (December 14, 2001)("NPRM").

Rockwell Collins is an active participant in numerous RTCA committees recommending technical standards for avionics equipment. Rockwell Collins is also active in the policy formation of the future national airspace system with the Federal Aviation Administration (“FAA”). In addition, Rockwell Collins is an active participant with the US delegation of to Working Party 8D of the International Telecommunications Union – Radiocommunications (ITU-R) Sector.

## **DISCUSSION**

Rockwell Collins commends the Commission for undertaking the complex task of bringing the FCC’s regulations in-line with today’s technological advances. We are pleased the FCC is amending Part 87 and hope the Commission will continue to stay abreast of the technological advances affecting the national airspace system.

Our comments will be limited to the following issues:

**A. Aeronautical Mobile Satellite (Route) Service (AMS(R)S) Issues:** Rockwell Collins supports the goal of the Commission to correct the maximum power output permitted under the rules.<sup>2</sup> However, Rockwell Collins would suggest an alternative approach that meets the Commission’s objective while simultaneously making the regulations more clear to those who must rely on Part 87 in order to properly manufacture avionics equipment. The Commission wishes to limit the system output power to 60 Watts after accounting “for RF cable and diplexer losses.”<sup>3</sup> Satellite communications systems utilize low noise amplifiers (LNA) and Diplexers between the High Power Amplifier (HPA) and antenna. The LNA/Diplexer contains a low noise amplifier and additional filtering (Diplexer) to permit simultaneous receive and transmit operation through a common antenna as well as to provide additional suppression of undesired

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<sup>2</sup> NPRM, Paragraph 8.

<sup>3</sup> Id.

emissions. Because the filtering provided by the Diplexer is an essential element to satisfy the emissions specifications, the common reference point used by the RTCA Minimum Operational Performance Standards (MOPS)<sup>4</sup> is the antenna port of the LNA/Diplexer. Rockwell Collins suggests that Section 87.131 continue to specify 60 Watts. However, note 8 should be changed to read: “Power may not exceed 60 Watts per carrier, as measured at the transmitter output, including any installed Diplexer. The maximum EIRP may not exceed 2000 watts per carrier.”

Changing footnote 8 to 87.131 will allow for more consistency between RTCA DO-210D and the FCC’s rules. If the Commission does not maintain a common reference point after the Diplexer, Rockwell Collins is concerned that industry will be incorrectly required to meet all spurious and harmonic requirements at the HPA output, instead of after the filtering point provided by the diplexer. In addition, RTCA DO-210D, Section 2.2.4.2 discusses allowing 80 Watt HPAs to obtain 60 Watts output and specifies their measurement reference point.<sup>5</sup>

Rockwell Collins also supports the modifications of the Emission Limitations specified in Section 87.139(i) to reflect the latest technical standards.<sup>6</sup> We note that the proposed changes to 87.139(i)(1) appear to be derived from RTCA Document DO-210D, Change 1.<sup>7</sup> In order to make Section 87.139(i) consistent with the latest RTCA documents, we recommend the

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<sup>4</sup> Minimum Operational Performance Standards for Geosynchronous Orbit Aeronautical Mobile Satellite Services Avionics RTCA, Inc., DO-210D, April 19, 2000.

<sup>5</sup> Id. Section 2.2.4.2. The document only excludes the coax cable to the antenna.

<sup>6</sup> NPRM, Paragraph 9.

<sup>7</sup> Minimum Operational Performance Standards for Geosynchronous Orbit Aeronautical Mobile Satellite Services Avionics RTCA, Inc., December 14, 2000.

following changes to 87.139(i):

- In the range 1610.6 to 1613.8 MHz, 80 dBW/MHz should be “**-80 dBW/MHz**” because this limit references a particular power level (dBW).<sup>8</sup>
- In the range 1660 to 1670 MHz, 49.5 dB/20 kHz should be “**-49.5 dBW/20 kHz**” because this limit also references a particular power level (dBW). We also believe “W” may have mistakenly been left out of the table in the NPRM.
- A new note should be inserted for frequency bands 1610.6 to 1613.8, 1626.5 to 1660 and 1660 to 1670. This footnote should reflect Table Note 5 within Note 12 of DO-210D Change 1, which states: “This level is not applicable for Intermodulation products.”<sup>9</sup>
- A new note should be inserted for frequency bands 1626.5 to 1660 and 1660 to 1660.5. This footnote should reflect Table Note 6 within Note 12 of DO-210D, Change 1 which states: “The upper limit for the excess power for any narrow band spurious emission (excluding Intermodulation products within a 30 kHz measurement bandwidth shall be 10 dB above the power limit in this table.”<sup>10</sup>

Rockwell Collins supports the authorization of the 1610-1626.5 and 5000-5150 MHz AMS(R)S bands under Part 87, if priority and real time preemptive access mechanisms are provided.<sup>11</sup> Although the International Telecommunications Union (ITU) is not considering expanding the full range of protections of specific priority and real-time preemptive access, we believe these frequencies should receive the same protections afforded the entire 1545-1559 and 1646.5-1660.5 MHz bands.<sup>12</sup>

Adding the 1610-1626.5 and 5000-5150 MHz bands as AMS(R)S bands implies that these systems will be used to support safety-of-life services. To be financially viable, services requiring the priority and preemption requirements have to be shared with public correspondence

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<sup>8</sup> DO-210D, Change 1, Section 2.2.4.2.5 does not express values as attenuation, but as dB referenced to the carrier, dB referenced to an absolute power level, or as power density. DO-210D therefore states its values with a “-“. Part 87 describes the table entry as “Attenuation” with respect to the carrier. Although this allows for positive values (a positive attenuation is equivalent to a negative gain), unfortunately, this approach is less clear when specifying absolute power. For example, dBW = dB referenced to 1 Watt. One could interpret 80dBW as being 80 dB attenuation from 1 Watt, but that is not standard engineering practice.

<sup>9</sup> Without a specific exemption for Intermodulation Products, Section 87.139(i)(1) would require those same products to be down at least 60 dB.

<sup>10</sup> The intent of this note in DO-210D, Change 1 was to establish a limit of -60dBc for narrow-band discrete spurious emissions in the transmit band while establishing a tighter limit of -70 dBc for emissions due to wide band noise. During the investigations leading to the adoption of DO-210D, Change 1, these limits were found to be the best achievable with current design technology.

<sup>11</sup> See NPRM Paragraph 11.

services. Sharing with public correspondence traffic also encourages system operators to install sufficient capacity at ground earth stations to handle the non-safety traffic.

In addition, unless priority and real-time preemptive access capability is designed into the system protocols for all terminals (not just aircraft terminals), public correspondence traffic will become a competitor for system resources instead of the additional bands being a pool of additional resources that can be re-assigned to safety-related traffic when necessary. For example, in an emergency situation involving the national airspace system, it is far more likely a ground earth station's capacity will be exceeded than the equipment on-board an aircraft.

Protecting the availability of aircraft frequency resources to support safety-of-life communications is essential to the nature of AMS(R)S communications in bands where non-safety communications are also allowed. The RTCA has established minimum priority and preemption requirements for AMS(R)S systems.<sup>13</sup> These requirements have been specifically developed to address future AMS(R)S systems, independent of the operating frequency band of the system. Consistency by the Commission in protecting the AMS(R)S bands is preferable to consistency in not protecting the AMS(R)S bands. Rockwell Collins would urge the Commission to provide the 1610-1626.5 and 5000-5150 MHz bands the protections they deserve.

**B. Equipment Certification Issues:** Rockwell Collins supports the Commission's desire to no longer require equipment manufacturers to obtain a waiver of Section 87.173(b) of the Commission's Rules to certify dual spacing aviation transceivers.<sup>14</sup> Aircraft must have the capability of communicating reliably with ground stations as directed, and on the frequencies

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<sup>12</sup> NPRM Footnote 24.

<sup>13</sup> See RTCA DO-262, Minimum Operations Performance Standards for Avionics Supporting Next Generation Satellite Systems, Section 2.2.3.3, December 14, 2000.

<sup>14</sup> NPRM Paragraphs 22-25.

specified, by air traffic controllers. Currently, seven western European countries and the United Kingdom utilize 8.33 kHz channel spacing.<sup>15</sup> Although there are no current plans by the FAA to implement 8.33 kHz channel spacing in the United States, U.S. industry, the FAA, and the FCC have recognized that air carriers operate internationally and their aircraft operate in countries that employ 8.33 kHz spacing.<sup>16</sup> In order for aircraft to operate in the airspace of these countries, they must have the capability of transmitting and receiving on the 8.33 kHz spaced channels.

The Commission has stated that this capability could be impaired if US-registered aircraft were unable to communicate effectively with air traffic control facilities in the European countries employing 8.33 kHz spaced channels.<sup>17</sup> RTCA, Inc. (“RTCA”) and Aeronautical Radio, Inc. (“ARINC”) have approved U.S. VHF transceiver standards including 8.33 kHz channel spacing capability based on the ICAO recommendation.<sup>18</sup> The FAA has adopted Technical Standards Orders (“TSOs”) based on these industry standards<sup>19</sup> allowing certification of VHF transceivers with 8.33 kHz channel spacing capability.<sup>20</sup> Therefore, certification of such dual spacing transceivers should be permitted under Part 87.

Rockwell Collins also supports the Commission’s addition of the emission designators 8K33A3E to the A3E emission class, listing 8.33 kHz as the authorized bandwidth for the new emission designator, and creating a footnote limiting the use of 8.33 kHz bandwidth for aircraft in international flight and for equipment certification processes.<sup>21</sup>

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<sup>15</sup> Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland, and the United Kingdom.

<sup>16</sup> Rockwell Collins, Inc. Order, 13 FCC Rcd 2954 (WTB PSPWD 1998). *See also* NPRM paragraph 24.

<sup>17</sup> In the Matter of Rockwell Collins, Inc., Order, DA 02-106, released February 7, 2002. *See also* Rockwell Collins, Inc. Order, 13 FCC Rcd 2954 (WTB PSPWD 1998).

<sup>18</sup> See RTCA DO-168a, *Minimum Operational Performance Standards for Airborne Communications Equipment Operating Within the Frequency Range 117.975 - 137.000 MHz* and ARINC Characteristics 566A, 716, and 750.

<sup>19</sup> See the FAA’s TSO-C37d, TSO-C38d, TSO-C37c and TSO-C38c.

<sup>20</sup> Airborne equipment must be deemed airworthy by the FAA. Technical Standard Order Authorization pursuant to 14CFR21.601 is one manner by which the FAA approves airborne equipment.

<sup>21</sup> NPRM Paragraph 25.

The Commission proposes to add Time Division Multiple Access (TDMA) emissions as an alternative allowable emission in the VHF AMS(R)S band.<sup>22</sup> This is predicated on the assumption that VDL Mode 3 will be the accepted path to air traffic communications modernization. Rockwell Collins supports adding TDMA and suggests the Commission could avoid adding emissions and this issue by including language in Part 87 to permit all waveforms as long as the transmitters meet the other applicable technical specifications.<sup>23</sup> For example, CDMA could also be permitted.

Certification of Equipment for the Civil Reserve Air Fleet (“CRAF”): Rockwell Collins supports amending the Commission’s rules to allow the certification of radios that operate both inside and outside the civil aviation bands for equipment to be used for the CRAF.<sup>24</sup> Avionics equipment manufacturers are not seeking a new frequency allocation to allow transmission into bands not authorized by the Commission. Rather, we require equipment certification that will allow aircraft to continue to communicate with properly authorized civil and military aviation ground stations. Rockwell Collins believes that other users of the 137-152 MHz band will not experience harmful interference caused by extended frequency range transceivers because the operation of aeronautical VHF communications is highly regulated and restricted to communications with authorized ground stations. Further, flight crews are trained in the use of VHF communications procedures and required to select frequencies only from current published frequency tables, charts and databases. The common operational reliance on these aviation materials provides an extra measure of control over aeronautical VHF communications and differentiates this service from most other services the Commission regulates.

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<sup>22</sup> NPRM Paragraph 26.

<sup>23</sup> See NPRM Paragraph 34. The Commission is seeking comment on the more general question of whether it should continue to designate specific emission types on aviation frequencies not shared with other services, or allow licensees to utilize any emission type if the transmitters meet the other applicable technical specifications.

Moreover, there are over 30,000 installed radios in commercial civil aircraft operated by flight crews well versed in communications techniques. In addition, we can find no record of interference arising from the improper use of such transceivers.<sup>25</sup> The vast majority of these transceivers are not only approved by the Commission, they are also certified by the FAA and relevant regulatory agencies of other ICAO member states. In addition, air safety and national security will be enhanced because civil aircraft will be able to communicate with military air traffic control personnel when using military airfields.

**C. Certification of Equipment Requiring an FAA Showing of Compatibility with the National Airspace System.**<sup>26</sup> Rockwell Collins agrees with the principle of streamlining the coordination between the Commission and FAA Office of Spectrum Policy Management (FAA OSPM) during the equipment certification process. We have found that both the Commission and FAA work hard at performing their respective equipment certification coordination tasks. While both the FAA OSPM and the Commission develop policy, technical procedures, and criteria concerning the use, sharing, management, or allocation of the aviation radio frequency spectrum, only the Commission certifies the equipment used in the AMS(R)S service.

It has been Rockwell Collins' experience that the FAA OSPM, like the FCC, conducts itself in a professional manner and in the vast majority of cases, provides applicants with timely notice of questions regarding or objections to an equipment certification application. Although the current procedures are "cumbersome" to the FCC and in some cases to applicants,<sup>27</sup> Rockwell Collins believes that the proposal to first require a determination of equipment compatibility with the National Airspace System (NAS) will prolong the certification process

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<sup>24</sup> NPRM Paragraphs 28-29.

<sup>25</sup> Rockwell Collins has supplied over 30,000 extended frequency range transceivers to commercial aircraft worldwide.

<sup>26</sup> NPRM Paragraphs 30-31.



and be more burdensome to applicants. The proposed process of first showing that equipment is compatible with the National Airspace System will increase the total time required to receive equipment certification. In an economy where getting products to market quickly is extremely important, allowing simultaneous review by both the FAA and FCC will reduce the total time to processing an equipment certification application.

**D. Adding Additional Emission Types:** Rockwell Collins supports the Commission's proposal to add J2D as an acceptable data emission type for enroute HF communications.<sup>28</sup>

Technological advancements in digital communications are producing rapid changes in the emission types being implemented in various systems, including satellite communications systems. In addition, the Commission asks whether it should continue to designate specific emission types on aviation frequencies that are not shared with other services, or allow licensees to utilize any emission type in these frequencies if the transmitters meet the other applicable technical specifications.<sup>29</sup> Rockwell Collins supports this proposal, provided there is a clear approach to ensuring technical specifications are developed, defined, tested and followed. Rockwell Collins is concerned the impacts of interference, particularly ultra-wideband interference communication types that may raise the overall spectrum noise floor, be clearly understood.

**E. Additional Issues:** The FCC and industry would both like to ensure that the rules stay abreast of technological advances. The desire to provide higher speed data services to passengers and crew on board aircraft is driving rapid advances in technology. Keeping pace of satellite service offerings are a particular challenge in the face of rapidly advancing satellite

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<sup>27</sup> NPRM Paragraph 31.

<sup>28</sup> NPRM Paragraph 34.

<sup>29</sup> Id.

technology combined with multiple potential satellite services that conform to specific modulation type and bandwidths.

Industry is currently developing a service for aircraft that supports 64kbps data rates. Unfortunately, this service is not currently supported by Part 87 because it uses new modulation types and a slightly wider bandwidth than currently authorized by the Commission.<sup>30</sup> It is anticipated that additional services will be added every few years as technology continues to advance. Rockwell Collins believes the Commission should consider the possibility of eliminating all requirements that are specific to data rates and modulation types (other than providing this information to the FCC for informational purposes), and to establish bandwidth limitations that would accommodate future services, while preventing interference to systems to other users within the AMS(R)S band.

## **Conclusion**

The Commission's NPRM contains the proper emphasis on reflecting technological advances affecting the aviation radio service, creating greater conformity between these rules and other Commission rules, and eliminating duplicative, outmoded, or unnecessary regulations. In the foregoing comments, Rockwell Collins offered an alternative to the Commission's changes to the AMS(R)S which will make Part 87 more technically accurate and clear to users. We support all the changes the Commission proposes regarding streamlining the equipment certification process except requiring FAA coordination before an FCC certification application can be filed. We hope the Commission will be receptive to new technologies being introduced which will allow high speed data transfer to and from airplanes. Rockwell Collins looks forward

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<sup>30</sup> Due to the proprietary nature of this system, we cannot provide more detail at this time.

to working with the Commission on these important issues. Please direct any questions to Joe Cramer at 703-516-8213.

Respectfully Submitted,

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